Weekly Report
2016.06.27-2016.0717

Security Project

1. Realize the operation recording function. Make it possible to record each step taken by the user and to go back to any step taken before (still working on that)
2. Figure out the data structure that should be used when a saving requirement is made by the user to save the current graph result
3. Write the open file, save result, create new file function of the system

Survey (Lizongzhuang)

Read the finished parts of his survey

Travel

Enjoy a tourism in Thailand and Macow for 11 days.

Paper Reading

Characterizing Provenance in Visualization and Data Analysis: An Organizational Framework of Provenance Types and Purposes（TVCG 2016）

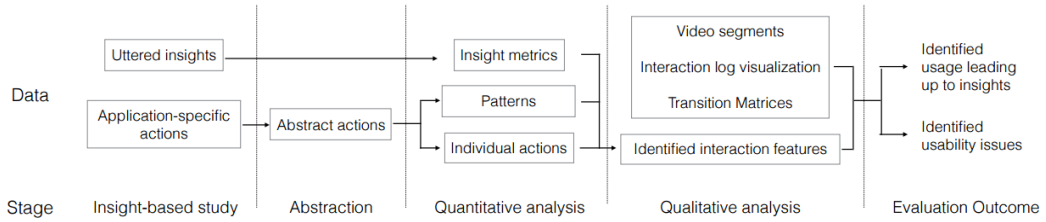
This paper summarizes types of provenance and purposes of provenance in the field of visualization and data analysis. The following table shows an overview of perspectives of provenance information types (5 types: data, visualization, interaction, insight, rationale) and purposes (6 types: recall, replicate, action recovery, collaborative and communication, presentation, meta-analysis) as emphasized in a sample of visualization projects.

Citation (Abbreviated)	Discipline/ application	Type Emphasis					Purpose Emphasis					
		Data	Vis	Interaction	Insight	Rationale	Recall	Replicate	Action Recovery	Collab. Comm.	Present	Meta-Analysis
Bavoil 2005 [5]	scientific workflows	■	■	■	■		■	■	■	■		
Del Rio 2007 [22]	map creation	■	■				■	■	■			■
Derthick 2001 [24]	various		■	■			■		■			
Doboš 2014 [25]	3D modeling	■	■	■			■	■	■			
Dou 2009 [26]	financial analysis			■	■		■			■	■	
Dunne 2012 [27]	network graph		■	■			■		■	■	■	■
Ellkvist 2008 [28]	scientific workflows	■	■	■			■	■	■	■		
Gotz 2008 [37]	business; financial			■	■	■	■		■		■	
Groth 2006 [39]	3D molecule vis		■	■	■	■	■		■			
Heer 2008 [41]	various		■	■	■	■	■		■	■	■	
Heer 2012 [42]	various		■	■	■	■	■	■	■	■	■	■
Hensley 2014 [43]	sensor data workflow	■					■	■				■
Javed 2013 [50]	various	■	■	■	■	■	■	■				■
Kadivar 2009 [51]	various		■	■	■	■	■	■				■
Kurlander 1988 [54]	graphics editor		■	■			■		■			
Lipford 2010 [58]	financial analysis			■	■		■			■	■	
Maguire 2012 [62]	scientific workflow	■					■	■				■
Mahyar 2014 [63]	intelligence analysis				■	■	■			■		
North 2011 [69]	various			■	■	■	■	■				
Parker 2005 [71]	scientific workflows	■										■
Shrinivasan 2008 [89]	various	■	■	■	■	■	■	■	■		■	
Simmhan 2006 [90]	scientific workflows	■		■	■		■	■		■		

In this way, the writer discusses the relationships between these factors and the methods used to capture provenance information.

A Case Study Using Visualization Interaction Logs and Insight Metrics to Understand How Analysts Arrive at Insights (TVCG 2016)

This paper follows an evaluation pipeline as below and focus on the quantitative analysis and qualitative analysis.



Quantitative Analysis:

1) absolute counts of individual actions and patterns were converted into frequencies before analysis
2) correlation analysis
3) extracted common patterns from interaction sequences

Qualitative analysis:

1) locate and marke the occurrence of the target pattern or action during each analysis session by looking at a visualization of the entire interaction log
2) watch the video segments (taken when the participants are operating on the system) corresponding to the target pattern or action to gather information not captured in the interaction data

Supporting Iterative Cohort Construction with Visual Temporal Queries （TVCG 2016）

This paper mainly aims designing a system that interactively extracts cohorts from databases with temporal constraints. In order to speed up the query process, their temporal query server employs various techniques to ensure the server’ s response is interactive:

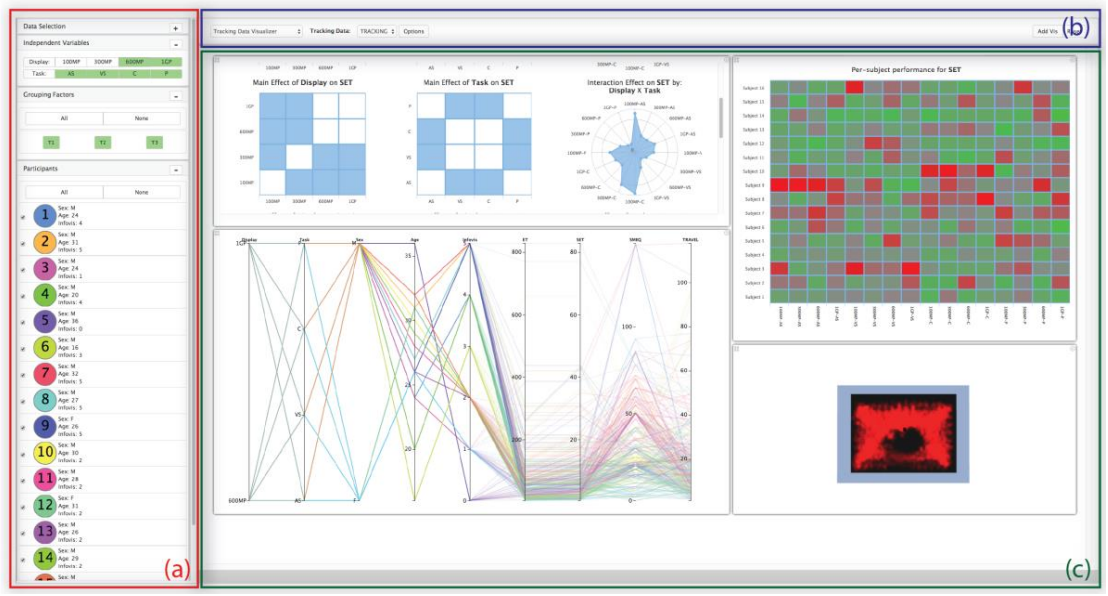
1) only compute the incremental changes rather than the full query
2) caching the most recent and most common queries
3) take a two-step query computation: first, the row based representation of point events in the database is converted into actual timelines while simultaneously filtering only for event types relevant to the query; then, the server recursively searches each timeline for matches of the users’ specification

VEEVVIE : Visual Explorer for Empirical Visualization, VR and Interaction Experiments (TVCG 2016)

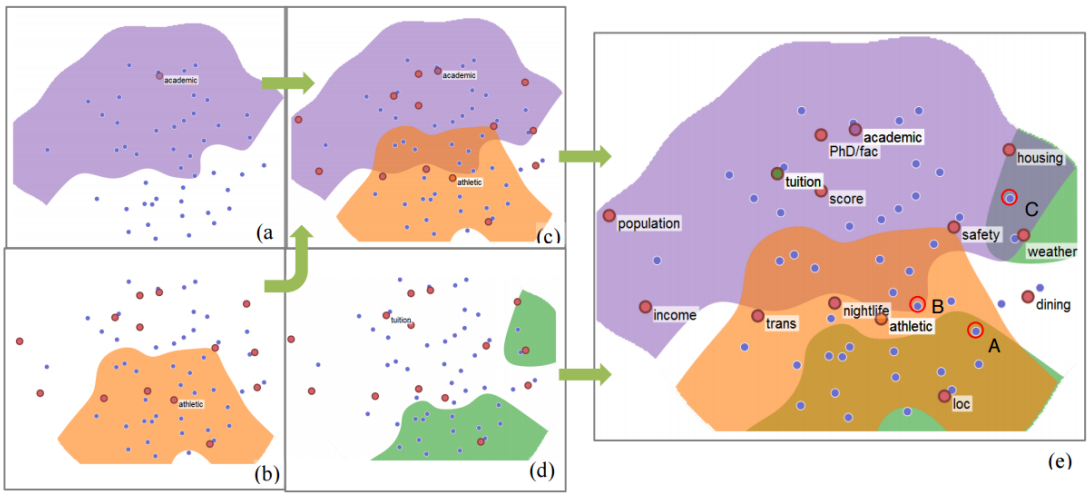
This paper designs an ontology that can represent a wide range of experimental designs and develops VEEVVIE front-end, through which researchers can conduct visual analysis of experimental data modeled in their ontology.

(a) data filtering controls: enable researchers to drill down data by toggling on/off factors of

independent variables, grouping factors, and/or individual subjects.
(b) selecting a widget and then binding experimental measurements to dimensions.
(c)widgets



The Data Context Map: Fusing Data and Attributes into a Unified Display (TVCG 2016)



map construction method:

1) using iterative MDS algorithm to achieve layouts with different priorities
2) using adaptive kernel density estimation (AKDE) to compute the kernel distance
   a) local density:

$$f(P) = \frac{1}{N}\sum_{i=1}^{N} K_H(\|P - P_i\|)$$

N: the number of points
Pi: each point

H: fixed bandwidth
F: local density

b) local smoothing parameter:

$$\lambda_i = (G/f(P_i))^2$$

G: geometric mean of all the samples local density

c) new bandwidth:

$$H_i = H \times \lambda_i$$

3) Creating the attribute distance field
based on the adaptive kernel distance, use Nadaraya-Watson kernel regression to obtain the estimated value.

$$x = \sum_{i=1}^{N} \frac{K_H(\|P - P_i\|) \cdot x_i}{\sum_{j=1}^{N} K_H(\|P - P_j\|)}$$

(the value at Pi is xi)

KH: kernel function (Gaussian function in this case)

4) creating the contour fields
5) creating the decision regions
6) xreating a fully segmented and self-labeled map